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P. Höst

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From the Institute for Ship-borne and Tropical Diseases in Hamburg

(Director: Geheimrat* Prof. Dr. F. Fülleborn).

Helminthological Division (Head: Dr. H. Vogel)

Phocascaris phocae n.g. n.sp., a new ascarid species from *Phoca groenlandica* Fabr.

By P. Höst (Oslo)

With 7 Figures in the text.

During my trip to the White Sea in the spring of 1931 to study harp seals (*Phoca groenlandica*) for the Norwegian Sealing Commission (Den norske Selfangstkommisjon), I had the opportunity to collect a number of parasites of this seal. Apart from known forms, the nematode material included a new species and genus of the superfamily Ascaroidea Railliet & Henry 1915, a description of which will be given below.

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I found the new species, which I would like to name *Phocascaris phocae*, in five harp seals. Unfortunately, a detailed examination revealed that the majority of the worms was immature. I found no more than 16 sexually fully mature specimens, namely 10 females and 6 males, in my material which consists of hundreds of these worms. The following description is based only on these fully mature specimens.

I will discuss first the characters which are shared by both sexes. The total length of the worms ranges from 34 to 51 mm. The body shape is relatively slender; the midpoint width of the nematodes is 0.85 to 1.42 mm, with relatively little tapering towards the two ends. The cuticle is about 0.025 mm thick and shows a fine, regular transverse striation. The distance between these striae is 0.0045 mm at the middle of the body. The striae are more closely spaced towards the two ends and occur at intervals of about 0.003 mm at the head and at the posterior end. Apart from this fine striation, the cuticle also has deeper transverse folds which occur at irregular intervals of about 0.015 - 0.053 mm. These thicker transverse folds vary in distinctness in the specimens examined and are often lacking in the middle of the body; they are probably artifacts which were produced as a result of fixation.

The head (Figs. 1 and 2) has three main lips, but no intermediate lips. The dorsal lip is nearly rectangular in shape and broader than the two ventral lips. The dorsal lip bears 2 large submedian papillae , the vental lips each bear a large submedian and a small lateral papilla. The lips are provided with fairly coarse dentate ridges on the adjoining edges, in addition, each lip has 3 deep incisions directed towards the oral opening. The cuticle has a tooth-like structure at the end of these incisions. The excretory pore is located between the two ventral lips.

A distinct cervical papilla is located in the lateral line, about 0.53 - 0.68 mm from the oral end. The nerve ring is situated 0.48 - 0.62 mm from the oral end.

The oesophagus (Fig. 3) is divided into an anterior, muscular part and a posterior, glandular part (ventriculus). The anterior part is more or less curved in the worms examined and has a length of 3.82 to 5.12 mm. The posterior, glandular part of the oesophagus, which corresponds to a reduced ventriculus, is very short and bears a sausage-shaped, solid appendix which is directed caudad and situated ventral to the intestine. A broad caecum originates on the dorsal side of the intestine where it joins the oesophagus and extends anteriorly on the dorsal side of the oesophagus where it terminates 0.78 - 1.15 mm from the oral end.

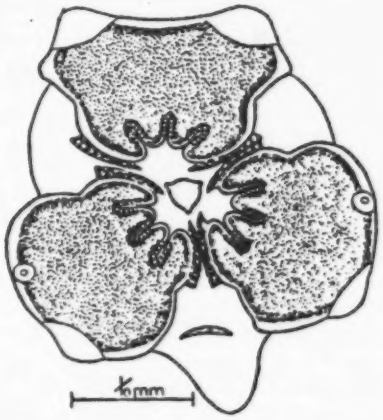

Fig. 1. *Phocascaris phocae*. Frontal view of head.

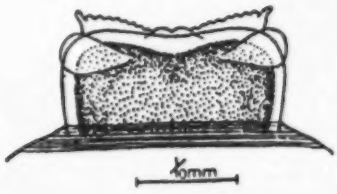

Fig. 2. Dorsal view of dorsal lip.

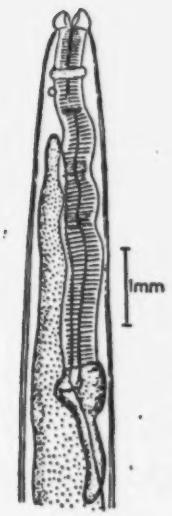

Fig. 3. Lateral view of anterior end, oesophagus and intestine with appendices.

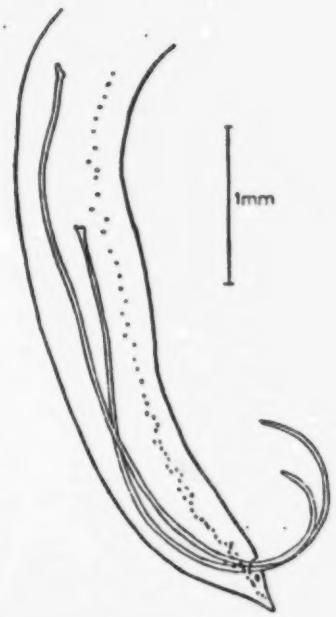

Fig. 4. Posterior end of male, lateral view.

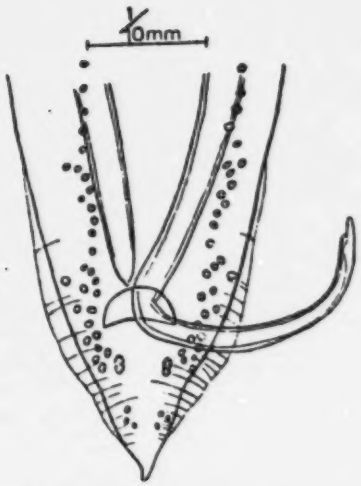

Fig. 5. Posterior end of male, ventral view.

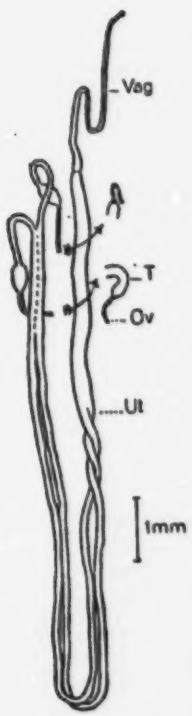

Fig. 6. Female genitalia (semi-schematic). Ov = ovary, T = oviduct, Ut = uterus, Vag = vagina.

Male:

Measurements:	
Total length	34.0 - 38.5 mm
Maximum width of body	0.82 - 1.04 mm
Width of head	0.22 - 0.32 mm
Cervical papillae to oral end	0.53 - 0.67 mm
Muscular part of oesophagus, length	3.82 - 4.00 mm
Oesophageal appendix, length	1.14 - 1.28 mm
Caecal sac, length	3.16 - 3.49 mm
Cloaca to posterior end	0.28 - 0.32 mm
Right spicule, length	4.28 - 4.90 mm
Left spicule, length	3.93 - 4.30 mm

The posterior end is conically tapered and curved slightly ventrad. It is provided with narrow, lateral alae.

The arrangement of the numerous papillae is shown in Figures 4 and 5. A larger double papilla and a group of 7 - 8 single papillae are situated closely behind the crescent-shaped opening of the cloaca, followed caudad by an apapillate part and then, close to the caudal tip, a group of 3 small papillae on each side. Anterior to the cloacal opening are 64 - 67 papillae on each side. They extend anteriorly from the cloaca over a distance of about 3.8 mm. All papillae are very short and squat, conical or more rounded in shape.

The two spicules are long and slender. The difference in size between the two spicules is only negligible. A gubernaculum or "accessory piece" is not present.

Female

Measurements:	
Total length	43.5 - 51.0 mm
Maximum width of body	1.15 - 1.84 mm
Width of head	0.27 - 0.31 mm
Cervical papillae to oral end	0.67 - 0.68 mm
Muscular part of oesophagus, length	3.99 - 5.12 mm
Oesophageal appendix, length	1.00 - 1.34 mm
Caecal sac, length	3.63 - 4.48 mm
Anus to posterior end	0.47 - 0.58 mm
Vulva to anterior end	13.5 - 18.6 mm

The female sex organs (Fig. 6) are somewhat different in form from those of related genera. From the vulva situated in the anterior part of the body, the vagina extends posteriorly, forms a loop and expands gradually towards the uterus without forming a seminal receptacle. The transition from vagina to uterus is not clearly demarcated. The distance between vulva and the beginning of the uterus is about 2.8 mm[1]. The entire uterus is conspicuously elongated and slender. The anterior, unpaired part is 0.3 mm wide and 4 mm long. It divides into 2 branches, each about 0.18 mm wide, which intertwine corkscrew-like and then extend side by side towards the caudal end. About 5 mm behind the point where they emerge from the common uterus stem, the two uterus branches curve around and extend again anteriorly along the opposite side of the intestine. The branches are fused over a short distance (see Fig. 6) whereupon they separate again, and each branch forms a fusiform expansion before they merge into the oviducts. The two oviducts extend in many convolutions and, together with the ovaries, form a dense, tangled structure. The part of the

[1] All measurements given for the female sex organs were taken from a female, 51 mm in length.

oviducts leading from the uterus is fairly thin. The diameter of the oviducts increases more and more towards the ovaries and finally reaches the diameter of the uterus branches. The point where the thin ovarian tubes open into the broad oviducts is distinctly set off.

The eggs are oval and thin-shelled and are already segmented when they are deposited.

Systematic position:

Superfamily Ascaroidea Railliet & Henry, 1915
Family Heterocheilidae Railliet & Henry, 1915
Subfamily Anisakinae Railliet & Henry, 1912.

The form described above does not agree with any of the previously erected genera of the Anisakinae. The structure of the oesophagus and the intenstine is related to that of the genera *Contracaecum* Railliet & Henry 1912, *Cloeoascaris* Baylis 1923, and *Heterotyphlum* Spaul 1927. Our form differs from *Contracaecum* in the absence of intermediate lips and the presence of dentate ridges on the main lips.

The genus *Cloeoascaris* does not have any intermediate lips like the form described herein, but it is characterized by a broad collar, by the absence of dentate ridges, by 2 large conical teeth on the inner side of each lip and by spines in the field between head and collar and, further, by the fact that unsegmented eggs are deposited. All these characters are absent in our form. *Heterotyphlum*, finally, is distinguished from our form by the absence of dentate ridges and by the oesophageal appendix which consists of a thin anterior and a thick posterior part.

If we do not want to change the diagnosis of the present genera of the Anisakinae, it will be necessary to erect a new genus for the ascarids which we have described herein. We name the new genus *Phocascaris*.

Diagnosis of the genus *Phocascaris:*

Anisakinae: Intermediate lips and a collar lacking, lips provided with dentate ridges. Oesophagus divided into an anterior muscular and a posterior glandular part (reduced ventriculus). One oesophageal appendix and 1 caecal sac present, the former of uniform width. Male: Spicules long. Only slight difference in length between the two spicules. Gubernaculum not present. Female: Vulva situated in the anterior part of the body. Oviparous. Eggs thin-shelled, segmented when deposited. Parasitic on seals.

Type species: *Phocascaris phocae*.
Host: *Phoca groenlandica*.
Site: Stomach and small intestine.
Locality: White Sea.

Pathological changes:

The majority of the worms were found in the stomach, a few also in the small intestine of the seals that were examined. The nematodes were anchored with their anterior end in the mucous membrane. In the stomach they always occurred in groups of several individuals.

To investigate the histological changes of the host tissue, I prepared a series of sections of a portion of the pylorus wall on which a group of relatively young worms was attached. It was noted that the parasites had penetrated deep into the thick mucosa. Fig. 7 shows a longitudinal section through the head of *Phocascaris* which has almost penetrated to the muscularis mucosae. A narrow, homogeneous zone staining bright red with eosin can be distinguished immediately adjacent the head. The substance of this zone seems to have been viscous prior to fixation since the impressions of the cuticular notches at the anterior end are clearly recognizable along its margin which has slightly shrunk as a result of fixation. In addition, as the margin has retracted, filaments have formed in places and extend between the free margin of the homogeneous substance and the cuticular projections. The soft mass between the lips of the worm forms a peg-shaped process which had evidently been sucked in by the parasite.

Fig. 7. Head of *Phocascaris phocae* attached to the pylorus wall of *Phoca groenlandica*. Longitudinal section, magnification x100. Hematoxylin-eosin stain. Remnants of gland ducts lie in the granulation tissue on the right side of the micrograph.

The gland ducts of the mucosa are destroyed in the area surrounding the anterior end and replaced by granulation tissue. It consists predominantly of round cells. Eosinophilic cells cannot be determined with certainty in my sections. The reason for this, in my view, is not so much the absence of eosinophiles but rather the failure of staining them successfully because of improper pretreatment of the material used for sectioning.

The histological picture described above agrees very well with the observations by Höppli (1927) on *Contracaecum*. We can agree with Höppli in assuming that the homogeneous substance wich surrounds the oral end was produced through the action of digestive juices of the parasite and that this necrotic, soft mass served as food for the worm.

The seals which I examined and which were infested with *Phocascaris* were in good general health. However, in view of the discussed pathological changes we can assume that heavy infestations will cause considerable injury in the alimentary canal.

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